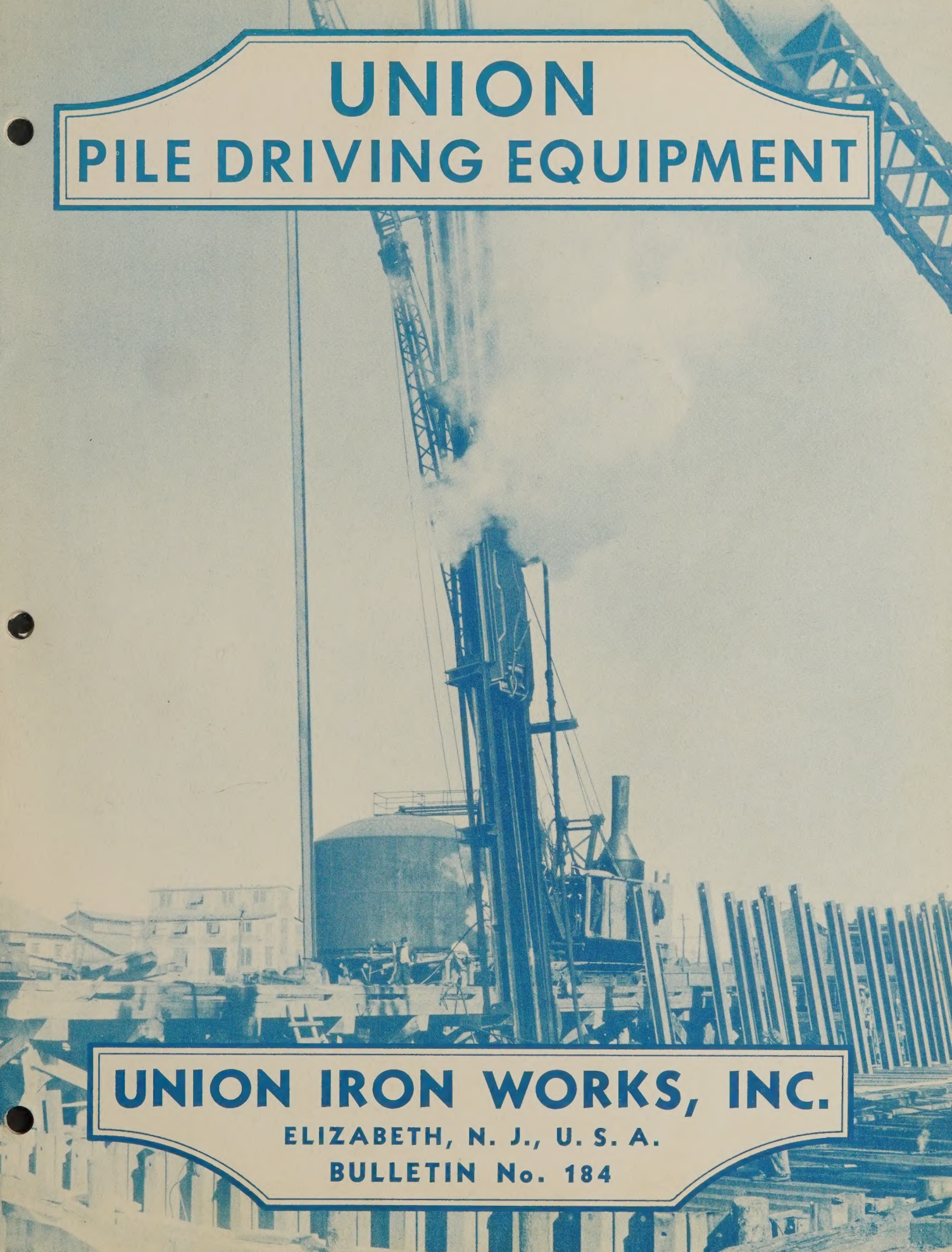
UNION
PILE DRIVING EQUIPMENT



UNION IRON WORKS, INC.

ELIZABETH, N. J., U. S. A.

BULLETIN No. 184

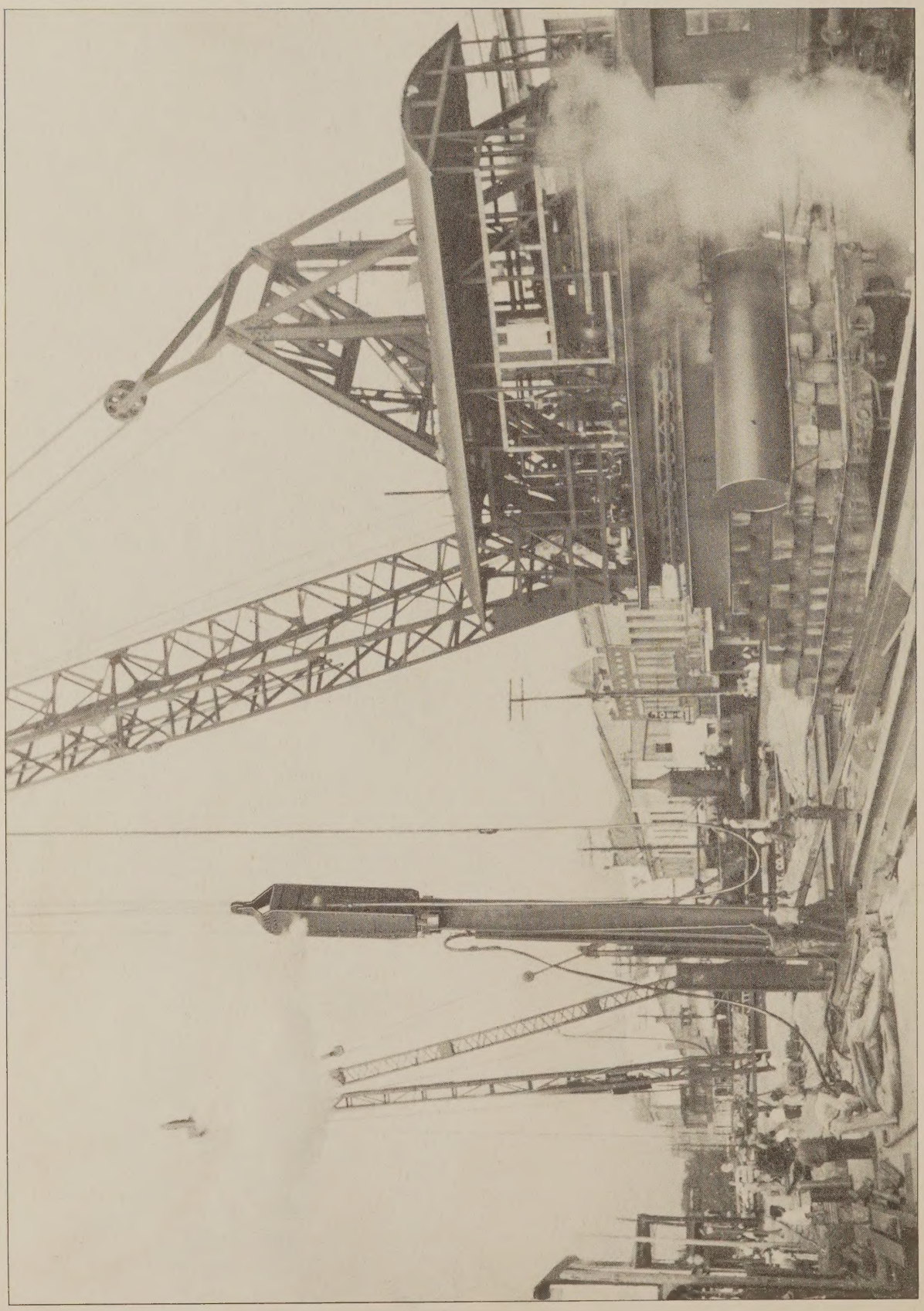
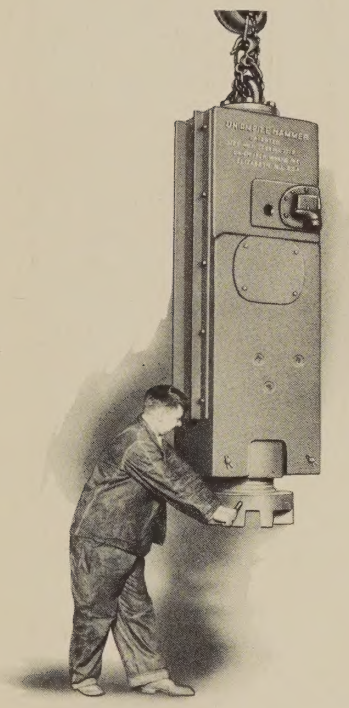


Fig. 1

Size 0A Union Pile Hammer driving 36" x 15" flange structural steel beams with a standard section of steel sheeting riveted to one flange for full length. Beams varied in length from 70' to 92' and weighed over 200 lbs. per lineal foot.

UNION DOUBLE-ACTING PILE DRIVING HAMMERS

(PATENTED)



The Base Rotates Within the Sleeve
Fig. 2

THE LATEST models of Union Pile Hammers are the result of over thirty years' experience in the design and manufacture of this type of construction machinery.

Present day practice calls for the driving of much heavier and larger piling of every kind, and in order to meet the increased demands on the pile hammer to drive the piling quickly and without damage we have redesigned our standard machines and have added several new sizes.

All materials entering into the construction of Union Pile Hammers have been carefully selected to give maximum service. Heat treated alloy steels, nickel semi-steel, alloy bronzes, etc., together with design based on many years' experience, have been combined to produce a simple, compact and highly efficient machine to stand up to the severe service under which the modern pile hammer must work.

The Union line offers a complete series of sizes to select from. Those who hold that heavy rams delivering blows at lower striking velocities are best for driving precast concrete piles, pipe, etc., will find that type of hammer included in the Union line.

Attention is invited to the following features and advantages, many of which are exclusive with the Union hammer:

One-piece frame, nickel semi-steel casting with average tensile strength of 45,000 lbs. per square inch, fully enclosing and protecting all working parts. This construction avoids the necessity of keeping body joints steam-tight.

Cylinder and ram guides cast integral in frame assuring perfect alignment of reciprocating parts at all times.

No bolts in the moving parts of hammer. Minimum number of parts.

Steam or compressed air can be used without changing any parts.

Economy of steam or air consumption.

All sizes can be used inverted to extract piles.

Bases to drive any kind of piling efficiently and without damage to same.

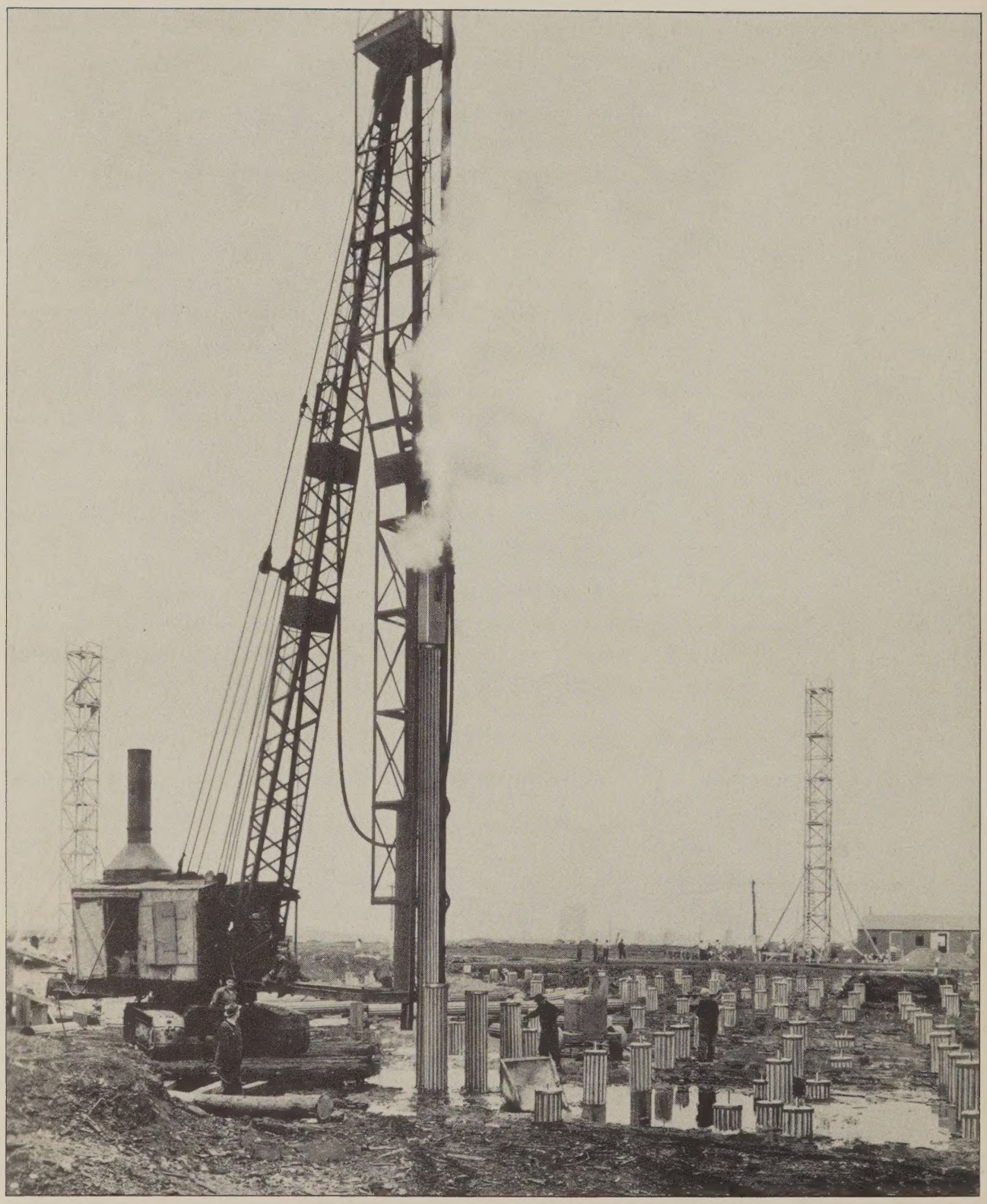


Fig. 3

One of two Size 1, Union Pile Hammers driving fluted steel casings for concrete piles at New York City's Municipal Airport, North Beach. Base equipment for fluted casings or steel pipe is obtainable for all sizes of Union Pile Hammers.

SPECIFICATIONS—UNION PILE HAMMERS

Size No.	Code Word	Average Weight †	Weight Striking Parts	Cylinder Diameter and Stroke	Energy Developed Per Blow *	Blows per Min. ‡	Boiler HP. Required 100-125 Lbs. Pressure	Free Air Per Min. 100 Lbs. Pressure §	Size of Inlet and Hose	Width Between Leads
		Pounds	Pounds	Inches	Foot Lbs.			Cubic Ft.	Inches	Inches
00	ABADO	21,000	6,000	14 x 36	54,900	85	125	------	3	36
0A	BIOCA	17,000	5,000	11 x 21	22,050	90	60	800	2½	30
1	ABAIM	10,500	1,850	9½ x 21	13,100	130	40	600	1½	28
1A	BIPOG	10,500	1,600	9 x 18	10,020	120	40	500	1½	24
1½A	BIRGE	9,200	1,500	8 x 18	8,680	125	35	450	1½	24
2	ABALD	6,600	1,025	7¼ x 16	5,755	145	25	400	1¼	25
3A	BISOL	5,200	820	7 x 13½	4,390	150	25	350	1¼	20
3	ABASO	4,700	700	6¼ x 14	3,660	160	20	300	1¼	23½
4	ABAUD	2,800	370	5¼ x 12	2,100	200	12	150	1	20
5	ABCIP	1,625	210	4¼ x 9	1,010	250	10	100	1	17¼
6	ABERN	910	100	3¼ x 7	445	340	8	75	¾	14
7A	BIVIA	540	80	3 x 6	320	400	----	70	¾	----
8	ABFOD	200	40	2⅜ x 6½	210	Over 450	----	60	¾	----
9	ABGID	100	25	2 x 4	90	Over 550	----	45	½	----

† With average base. ‡ Average. Variable under certain driving conditions. §Actual delivery. *Based on 80 lbs. M.E.P.

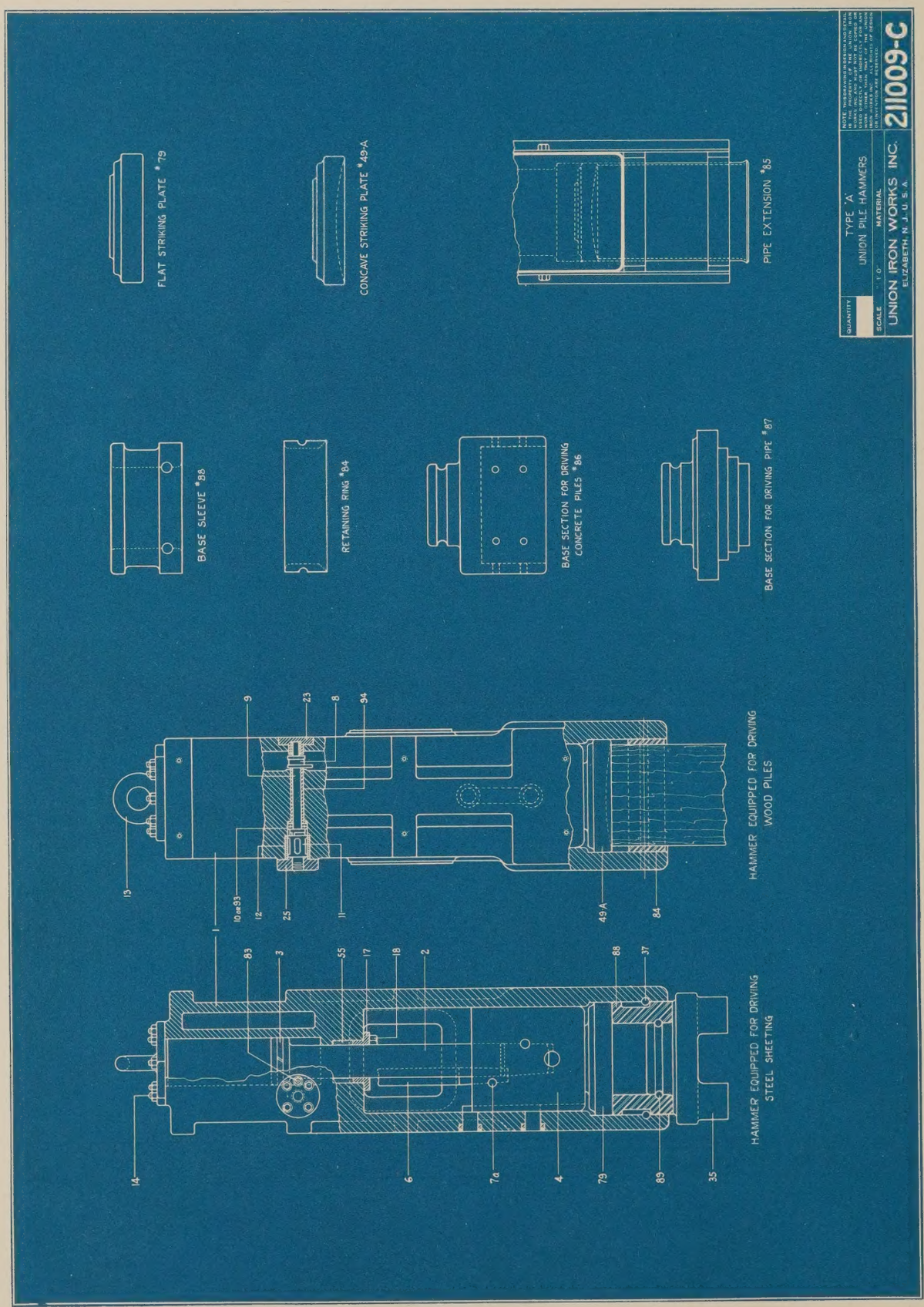
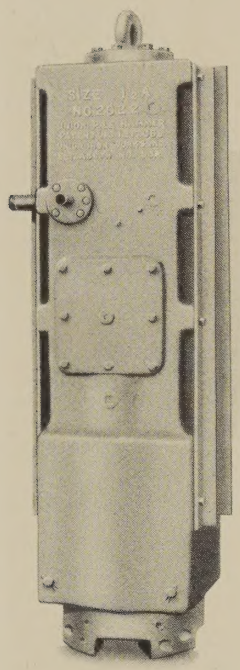
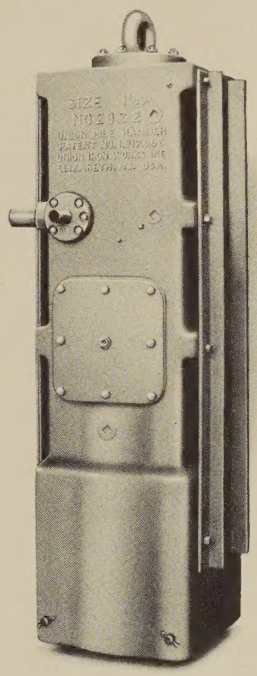


Fig. 4
GENERAL DRAWING TYPE 'A' UNION PILE HAMMERS AND BASES

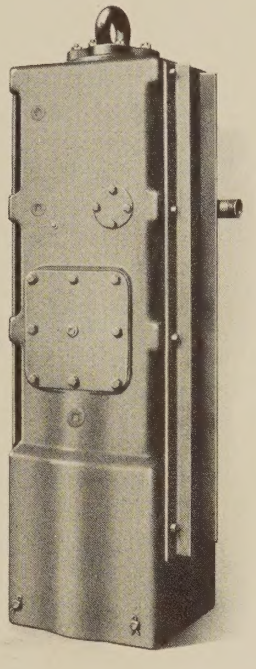
UNION, TYPE 'A', PILE DRIVING HAMMERS



Fitted with Sleeve Base for Steel Sheeting
Fig. 5



Front View When Fitted for Round Wood Piles
Fig. 6



Back View. Note Simplicity of Design
Fig. 7

REFERENCE TO LINE DRAWING, figure 4, will indicate the simplicity and ruggedness of the type 'A' Hammer. The ram is round, properly proportioned to deliver a maximum blow and moves in a machined circular section of the frame casting. The ram is guided and prevented from turning by a forged and machined alloy steel guide. This type hammer, while intended for every kind of pile driving service, has a number of features which make it particularly well adapted for certain kinds of work. Owing to its low center of gravity, the type 'A' Hammer requires less effort to hold upright and vertical when driving without leads. The non-starting safety feature, exclusive with the type 'A' Union Hammers, prevents the ram from lifting and striking unless the full weight of the hammer is on the pile. This feature is of extreme importance when driving 'batter' piling or when used without leads.

General compactness, comparatively narrow width, and economy of head room, make this type an ideal one for railroad pile driver service.

The type 'A' Union Hammers are fitted with our patented sleeve type bases for driving steel sheeting, concrete piles and pipe. For driving round wood piles a base ring with concave or 'bell bottom' striking plate is used. For further base information see figure 4 and description page 9.

A large capacity oil reservoir in the upper part of hammer frame takes care of all lubrication. The flow of oil is regulated by a valve screw, very easily adjusted, on inlet flange.

Union Pile Hammers deliver the full power of the ram blow to the head of the pile. Steam or air is not used as a 'cushion' in the cylinder.

The construction of all sizes of Union Pile Hammers is so simple that any ordinary mechanic can adjust and repair them.

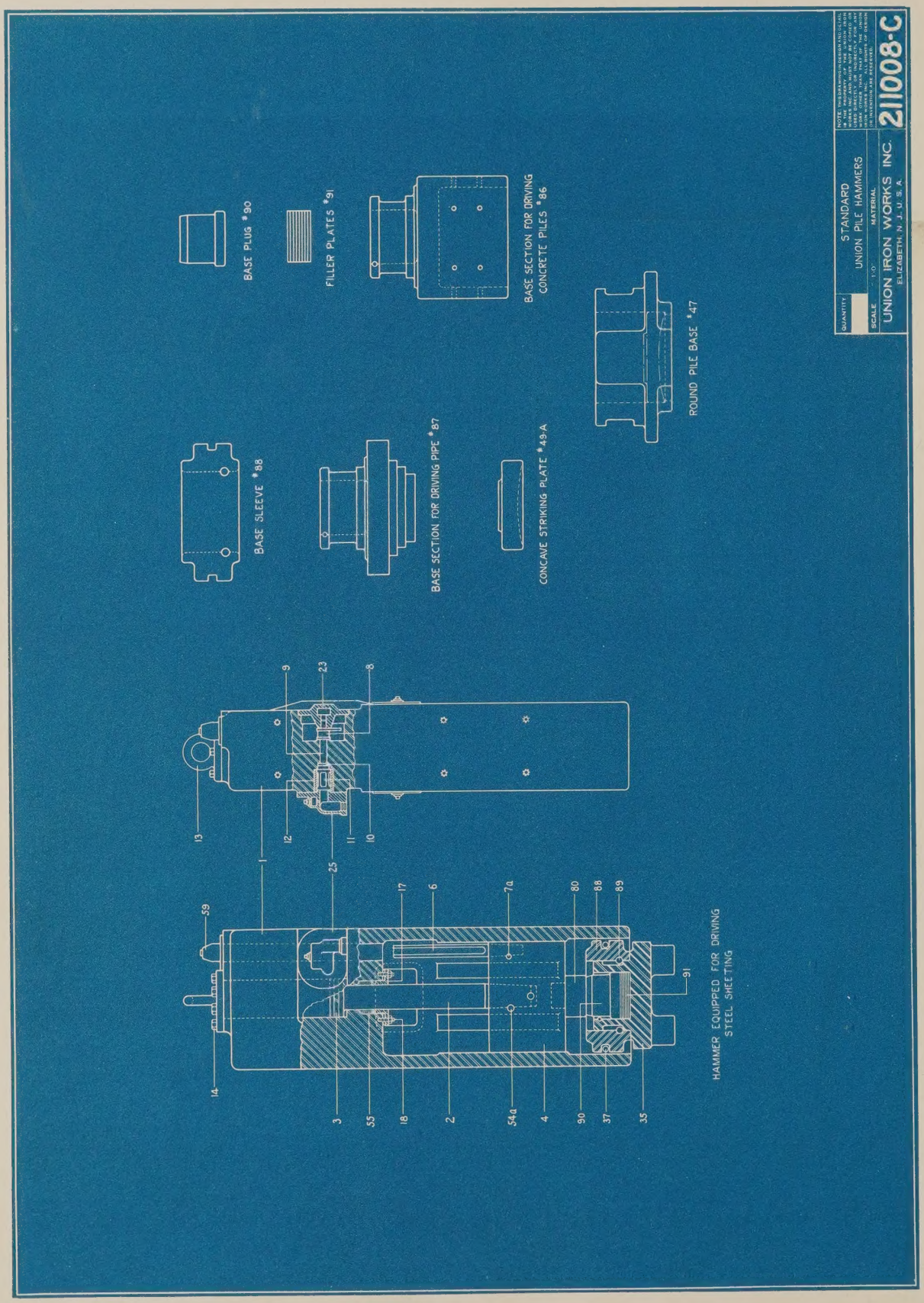
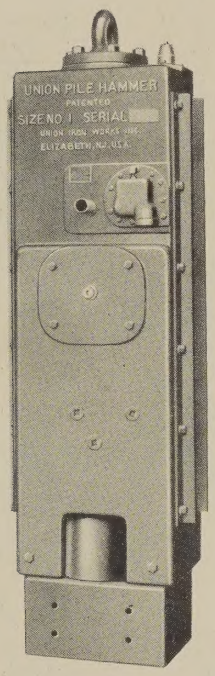


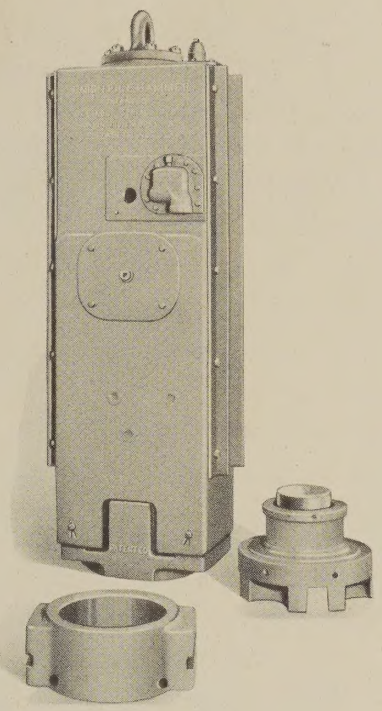
Fig. 8
GENERAL DRAWING STANDARD UNION PILE HAMMERS AND BASES

UNION STANDARD TYPE PILE DRIVING HAMMERS



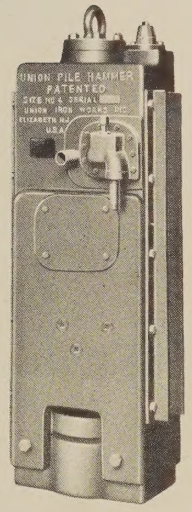
Hammer fitted with Sleeve Base to Drive Precast Concrete Piles

Fig. 9



Hammer with Patent Round Pile Base. Sleeve and Base Section for Steel Sheeting in foreground

Fig. 10



Sizes 3 and 4 are furnished with Standard Round Pile Base or Sleeve Base

Fig. 11

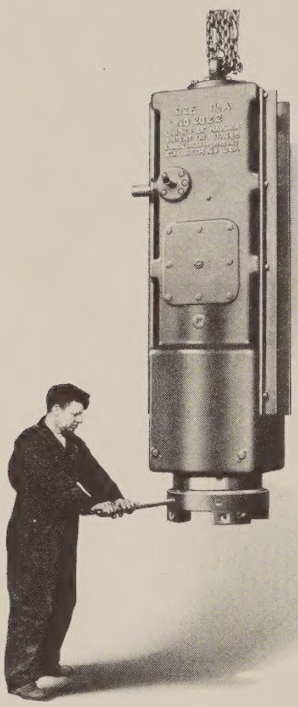
USERS of early Union Pile Hammers will immediately recognize the many refinements and improvements which have been made to the standard type machines. Reference to figure 8 and cuts show the fully enclosed frame; short cylindrical section valve rods; absence of valve rod and piston rod bolts; seated and locked simple adjustment gland, etc.

Sizes 1 and 2 have rams fitted with punches to center the blows and transmit maximum power, this being especially beneficial when hammers are used without leads and not held perfectly vertical.

Due to scientific design of steam passages, valves and valve gear, the boiler and compressor capacities required are very low. However, figures given on specification page 4 are for maximum service.

Standard model Union Hammers can be fitted with our patent sleeve type base for driving steel sheeting, concrete piles and pipe; these bases being supplied for those sizes which are proper for driving the various kinds of piling enumerated. For driving round wood piles our patent round pile base is used. The smaller sizes used for wood sheeting are fitted with jaws and flat striking plate. For further information relative to bases refer to figure 8 and page 9.

UNION PILE HAMMER—BASE EQUIPMENT



Turn the Base, not the Hammer
Fig. 12

THE UNION Patented Sleeve Type Base is furnished for both Type 'A' and Standard Hammers. The component parts consist of a sleeve which fits against the machined surfaces in the lower part of the Hammer frame and a base section. The sleeve holds the base section and receives any shock or stress which with ordinary types of bases is transmitted to the Hammer frame.

In the case of Type 'A' Hammers, which have a circular bottom section, the sleeve fits closely against the inner wall and a flat alloy steel striking plate is placed on top of the sleeve and receives the blow of the ram. This plate providing a flexible or moving part to take care of any unevenness of alignment. Refer to Figure 4.

Standard Hammer frames, having a rectangular bottom opening, use a cast steel sleeve which is held on to the frame by the same bolts which hold the round pile base. The base section is fitted with a plug having the same diameter as the ram punch, and in order to take up any unevenness of alignment thin sheet steel filler plates are placed between the plug and the base section. Refer to Figure 8.

Beside providing a practical close fit or seat between the piling being driven and the Hammer, as well as to center the piling in the leads, or help hold the Hammer in correct position if driving without leads, this type of base protects the heads of the pile. Another very important advantage of the sleeve base is that the base section can rotate or turn in the sleeve so that whether driving with leads or without it is not necessary to have the Hammer lined up on the exact axis of the piling. See Figures 2 and 12.

Sleeve type bases can be furnished for all size Union Hammers from No. 00 to No. 4.

For driving round wood piles Type 'A' Hammers are fitted with ring and concave alloy striking plate. See Figures 4 and 6. Standard Hammers, sizes No. 1 and No. 2, are furnished with the patented round pile base. See Figure 10. Sizes No. 3 and No. 4 with the standard round pile base. See Figure 11.

All sizes of Union Hammers can be fitted for driving square timbers or wood sheeting.

For driving concrete piles the base sections for any size hammer usually fitted with sleeve type base are made of an alloy cast steel and furnished with either round or square box receptacles. The walls of the receptacle are drilled so that hard wood lagging can be added to accommodate smaller or irregular shaped piles, and the depth of the box is sufficient to add a rope mat or other protective device for pile head if it is deemed necessary.

Attention is called to the fact that once a hammer is purchased with a sleeve type base for one kind of piling it is only necessary to secure additional base sections for driving other types of piles as these sections are interchangeable when for the same size hammer.

UNION SHEETING HAMMERS

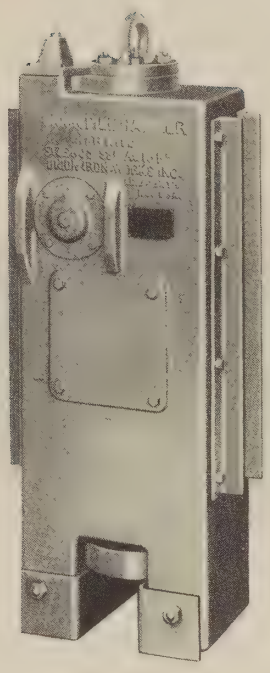


Figure 13

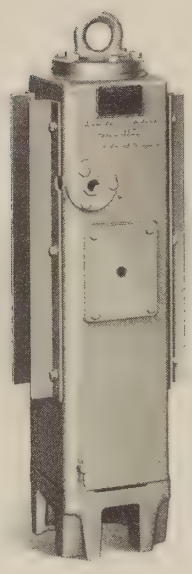


Figure 14

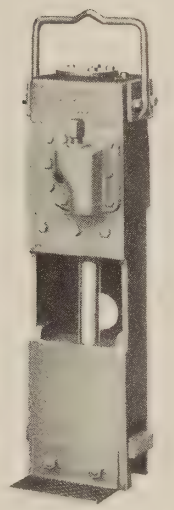


Figure 15

Figure 16

SIZES 5 and 6 are handy sizes for 4″ and 6″ wood sheeting. Figure 13 shows how these sizes are furnished with jaws and plate. Steel sheeting bases can also be used with sizes mentioned.

Figure 14 illustrates the No. 7-A Hammer fitted with a universal base suitable for driving up to 4″ wood sheeting and the lighter sections of steel sheeting. This Hammer incorporates all the features of the Type 'A' design such as self-contained reservoir for one point lubrication, non-starting safety device, etc. As will be noted from the illustration it is simple and compact, and a very handy machine for sewer and water main contractors.

Figure 15 shows our Union Junior Hammer which weighs 200 lbs. and is used primarily for driving 3″ wood sheeting. There are no outside valve mechanisms or exposed working parts. The jacket is of heavy steel construction securely attached to the cylinder block. The number of parts has been reduced to the minimum and there are no body bolts to keep steamtight or to leak air after continued use. The actual metered air consumption of this Hammer is 40 cubic feet per minute at 100 lbs.

The Union Midget Hammer, Figure 16, was designed for driving 2″ wood sheeting for sewer, water main and conduit trench work. The working weight of this Hammer is 100 lbs. and it is made entirely of steel, the only casting in the Hammer being the piston ring. There are no tie rods, exposed valve mechanisms or gadgets of any kind. The Hammer is ruggedly constructed, compact and easy to handle. The actual metered air consumption is 32 cubic feet at 90 lbs. pressure.

Both the size No. 8 and No. 9 Hammers can be fitted with different thicknesses of jaws to provide proper fit over the heads of the wood sheeting should same vary from the usual standard.

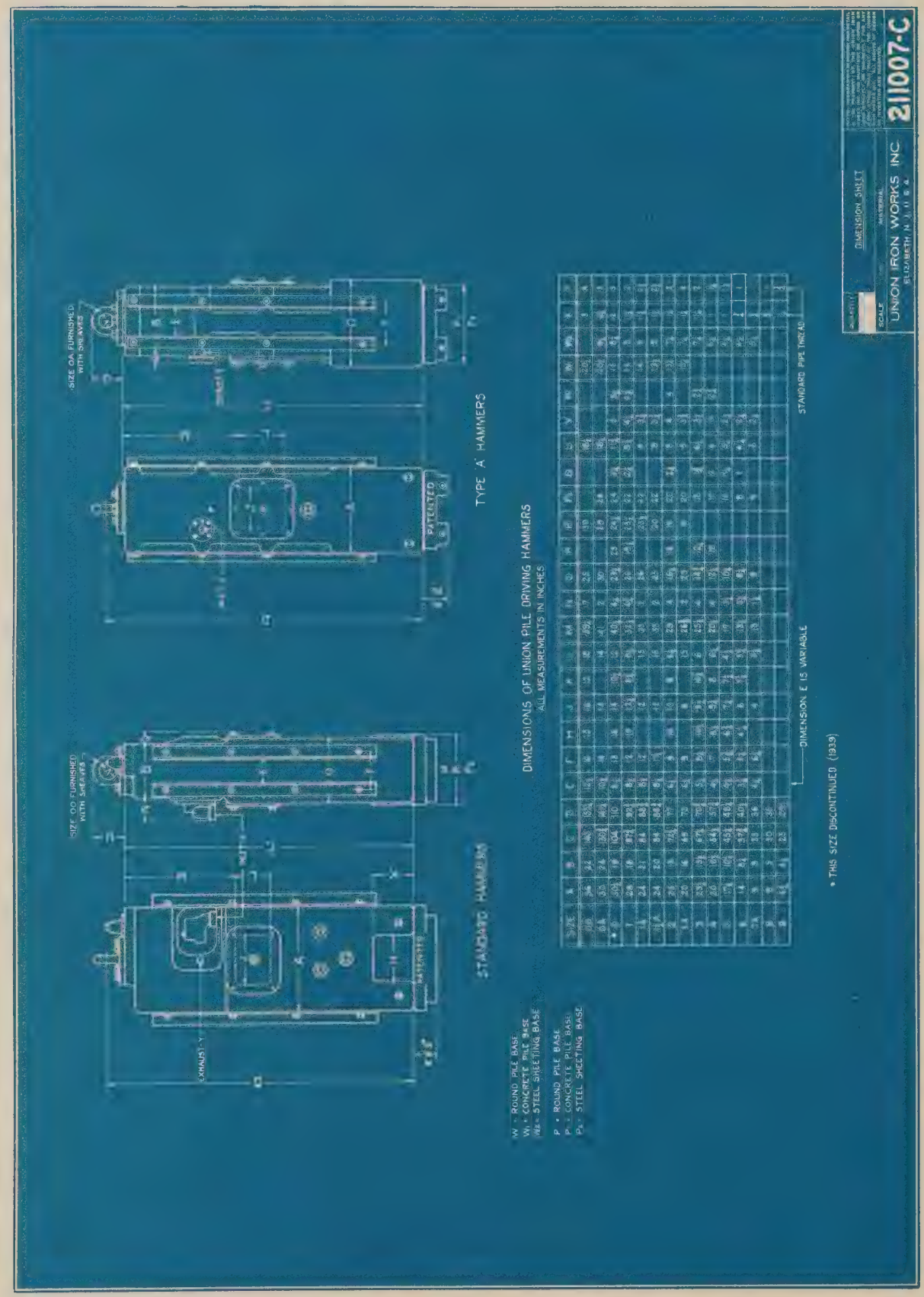


Fig. 17
GENERAL DIMENSIONS, UNION PILE HAMMERS

UNION PILE HAMMER HOSE

Figure 18

THIS is a flexible rubber and metallic Hose, four times stronger than all-rubber and considerably more flexible and serviceable than all-metal Hose. It combines the best features of both types and eliminates the disadvantages of either all-metal or all-rubber construction. Union Pile Hammer Hose has inner spiral winding of round wire partially imbedded in a heavy rubber steamproof tube over which there are the regular four plys of cloth insertion as in the case of all-rubber Hose. Additional protection is afforded by the fine wire galvanized braiding which in turn is again protected by a flat wire basket weave braiding, and the whole is covered by a spiral winding of half round wire. While somewhat higher in price it will outlast three or four pieces of regular hose. Furnished only in 25′ and 50′ lengths.

Size Hose	For Hammer Sizes	Code Word 25′ Length	Code Word 50′ Length
2½″	0A	**WYSSA**	**WYTUZ**
2 ″	0	**WYSTE**	**WYTVE**
1½″	1, 1A, 1½A	**WYSUX**	**WYPOS**
1¼″	2, 3A, 3	**WYSWO**	**WYPPA**
1 ″	4, 5	**WYTAT**	**WYPSO**
¾″	6, 7A, 8	**WYTEV**	**WYPUT**
½″	9	**WYTOY**	**WYRAR**

Hose always quoted and furnished with couplings attached unless requested otherwise.
3″ Hose for size 00 hammer must be made to order.

Fig. 19

We furnish with our Hose the Union Coupling which is special with long shank and heavy clamps. It is strong, durable and cannot injure the tube or covering. It is easily applied and is made for each standard size Hose. Unless ordered to the contrary Couplings are always furnished with female spuds, U. S. Std. pipe threads.

UNION HEAD BLOCKS

Fig. 20
STANDARD HEAD BLOCK
CODE WORD: **WYJKE**

Sheaves 14″ dia. for wire rope up to ¾″. Used for drop hammers up to 2500 lbs. and light weight pile hammers. The hammer line sheave is keyed to shaft.

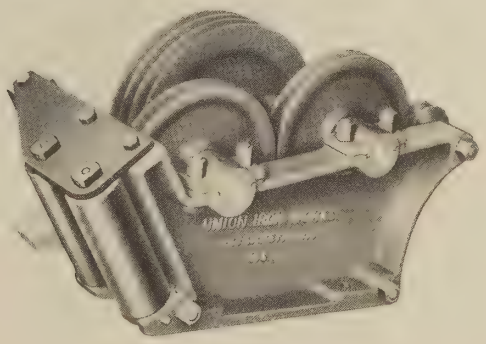


Fig. 21
SPECIAL HEAD BLOCK
CODE WORD: **WYJMO**

This head block has double pile line sheaves and side thrust rollers to insure keeping pile line in sheave groove. Furnished with one or two hoist line sheaves.

Fig. 22

CODE WORD: **WYEGH**

A UNION PILE DRIVING AND DERRICK CAR in our erecting shop prior to disassembling and packing for shipment to South America. We design and build these equipments complete for operation on 1 meter, 36", standard and 5′ gauge track.

UNION PILE DRIVING LEADS AND HANDLING EQUIPMENT

WE DESIGN and fabricate leads and handling equipment of every type and size. The following pages show some of the more or less standard types or at least those most generally used.

Enquirers should submit a fairly complete description of their work when asking for recommendations and proposals. Always keep in mind that height and reach (distance to center of hammer and pile from center of rotation or center of gravity of the complete plant) are the most important factors in determining cost. The same is true of the desired maximum 'batter' or inclination, whether sidewise or to the front or rear.

The net clear height of leads is always understood as the distance from ground or water line to the underside of hammer when in its uppermost position. When computing the required clear height be sure to deduct for any saving gained due to the up ended pile extending below ground or water line.

When leads are to be used with cranes always state the make and model of the crane, boom length and when possible the serial number. Besides height of leads state the working radius desired. This is figured from the center of rotation and not from boom heel.

We have designed and furnished many marine pile driving plants. A few are illustrated in this bulletin. For export the barges are set up complete before shipment then match marked and in the case of riveted construction all holes are reamed. In later years we have furnished a number of barges prefabricated for welding at destination. We are also prepared to furnish completely detailed drawings, timber lists and instructions for the framing of wood barges.

Our pile driving and derrick cars are furnished complete for operation on 36″, 1 meter, 48″, standard and 5′ gauge track. Car and running gear can be built to any standard. Those having a flat car on hand to mount the steel work, hoist, boiler, etc., should submit a drawing of same. Cars for this purpose must have heavy under frames.

OUR SERVICES AND FACILITIES ARE COMPLETE. WE DESIGN AND BUILD LEADS AND HANDLING EQUIPMENT TO EXACTLY MEET YOUR REQUIREMENTS.

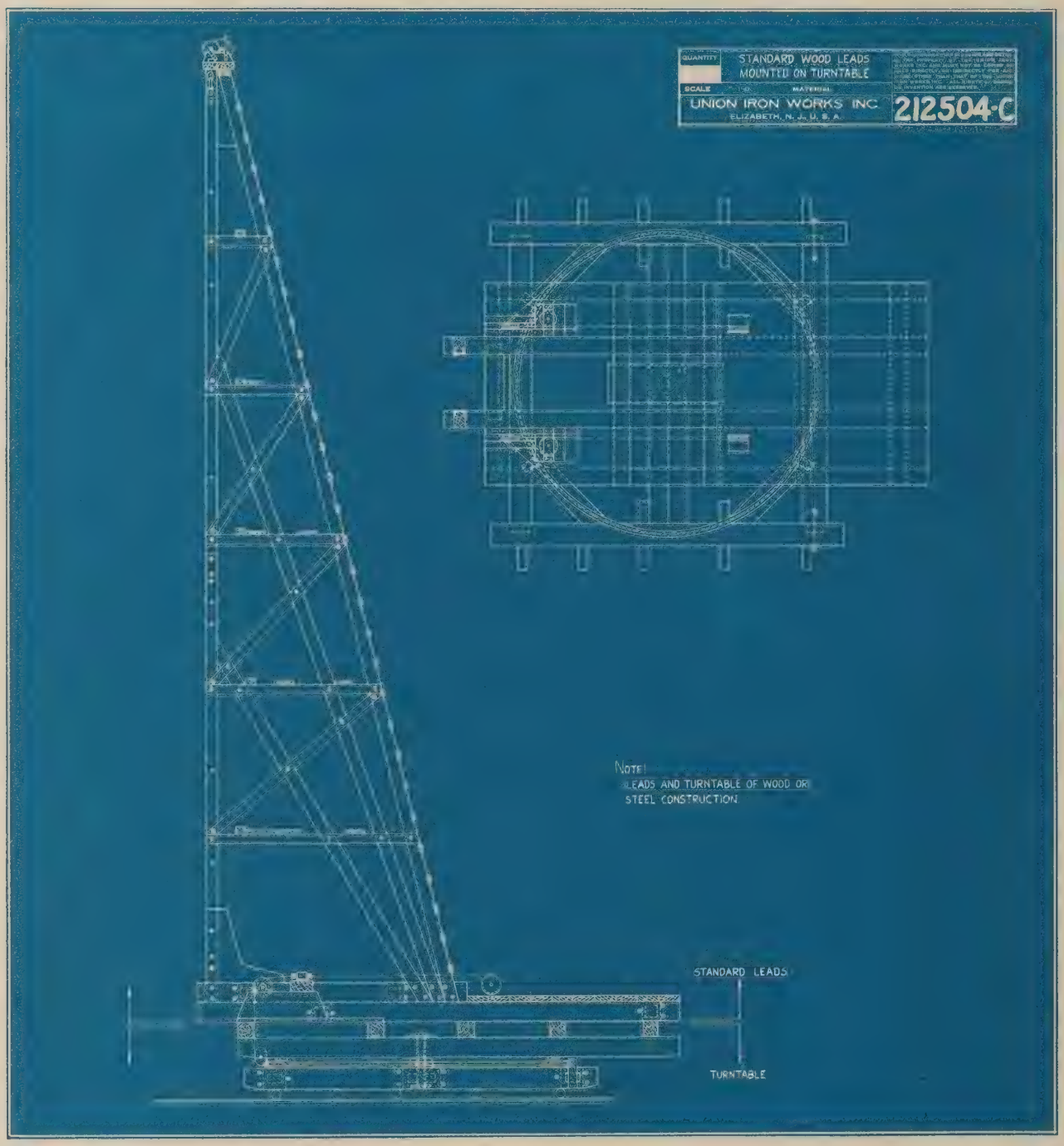


Fig. 23

CODE WORD—LEADS ONLY: **WYDAD**

CODE WORD—INCLUDING TURNTABLE: **WYDHO**

STANDARD CONTRACTORS' LEADS—WOOD CONSTRUCTION

We supply all steel work, forgings, ropes, pipe line, valves, bolts, tie rods, washers, hardware, sheaves, tackle blocks and drawings with timber lists for framing at destination.

Leads furnished with or without turntable. In no case do we supply the rollers unless ordered special.

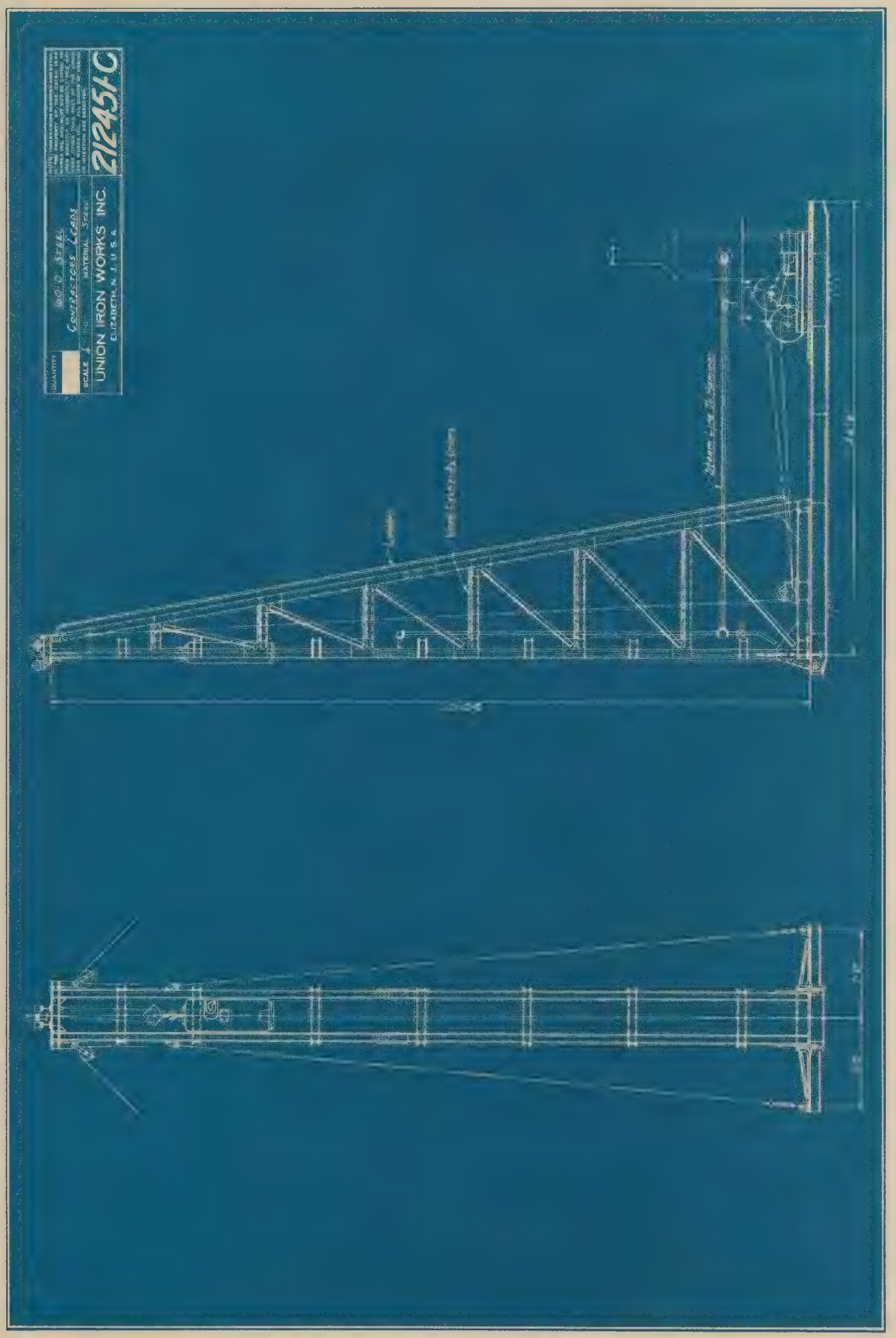


Fig. 24

CODE WORD: **WYFEG**

STANDARD CONTRACTORS' LEADS—STEEL CONSTRUCTION

Can be supplied with all steel turntable.

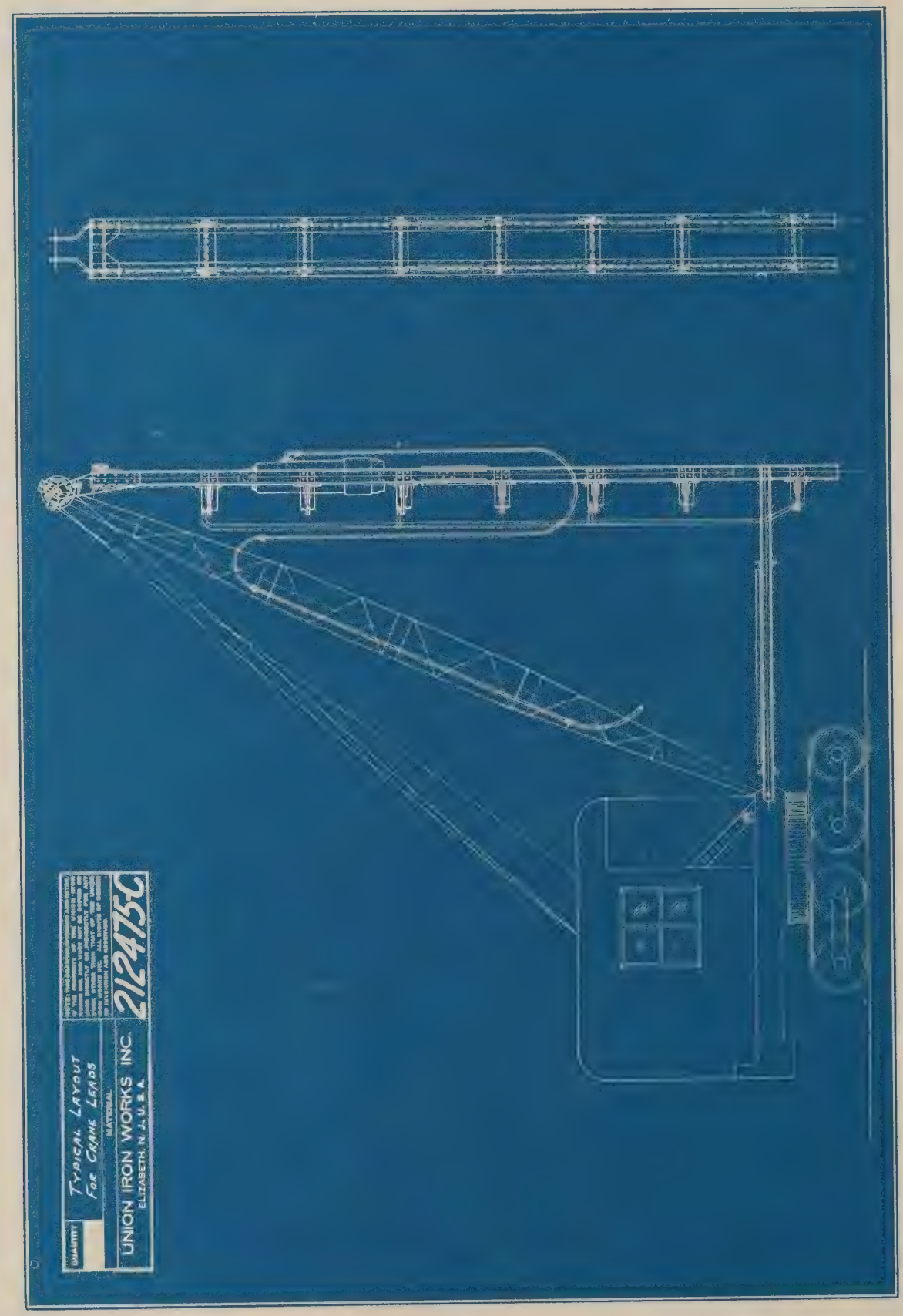


Fig. 25
CODE WORD: **WYFJO**
STANDARD STEEL UNDERHUNG CRANE LEADS

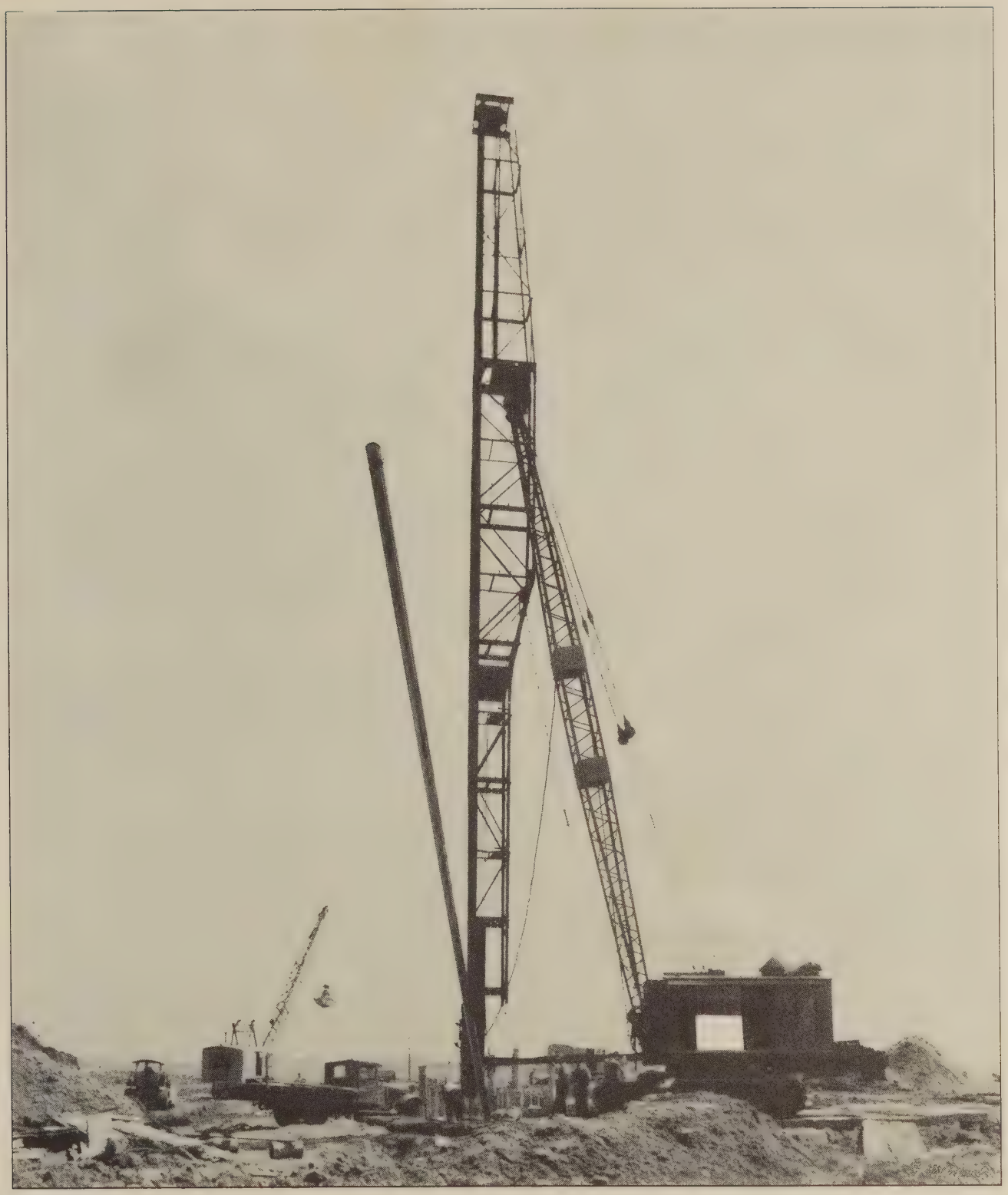


Fig. 26

CODE WORD: **WYFFA**

EIGHTY FOOT STEEL EXTENDED CRANE LEADS

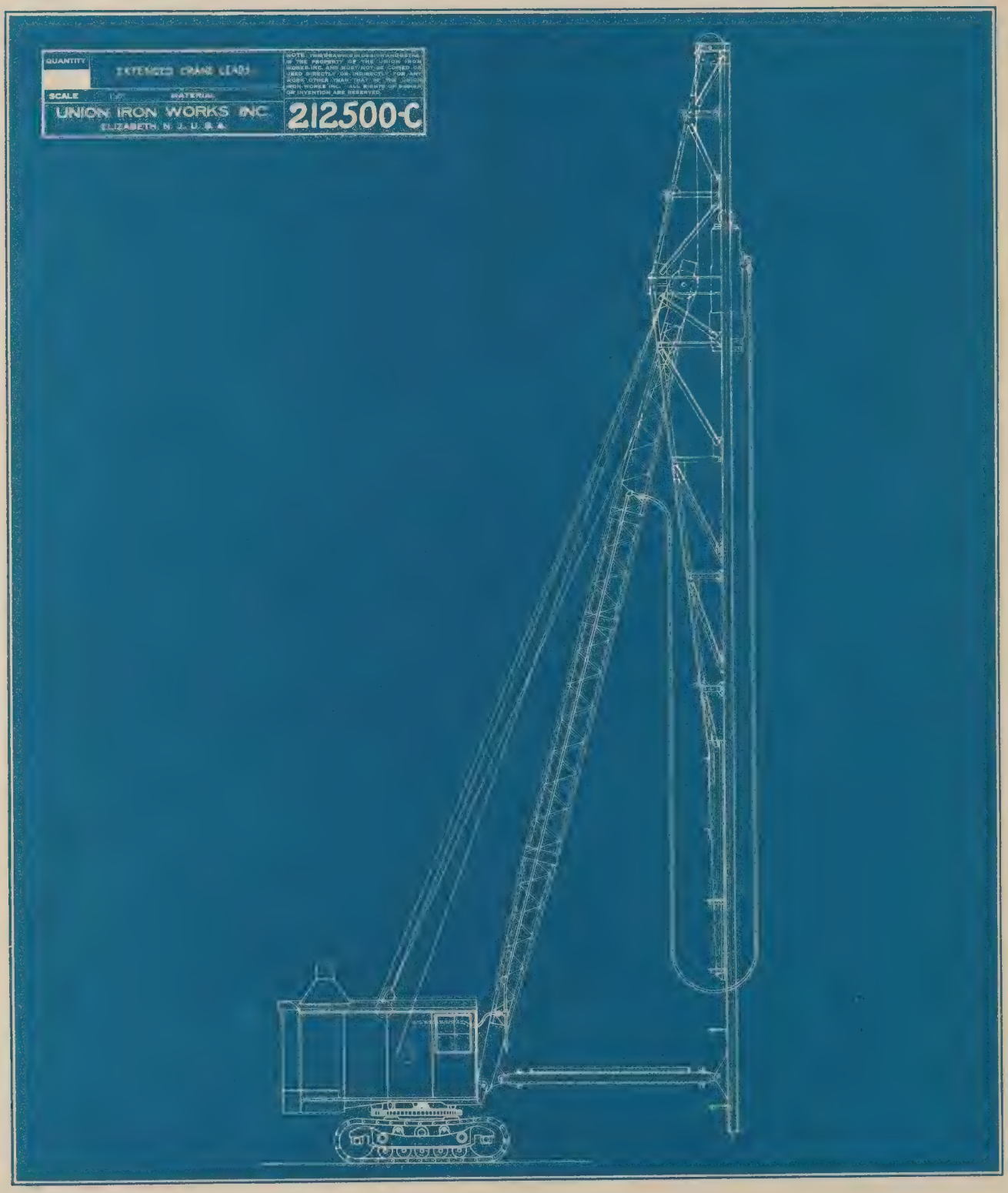


Fig. 27

CODE WORD: **WYFFA**

TYPICAL CONSTRUCTION OF ALL STEEL EXTENDED CRANE LEADS

LEADS FOR MARINE WORK

Fig. 28

CODE WORD: **WYEWY**

UNION ALL STEEL PENDULUM LEADS

This type is very popular for river and harbor work. Many have been supplied for dock and drill rig platform work in South America.

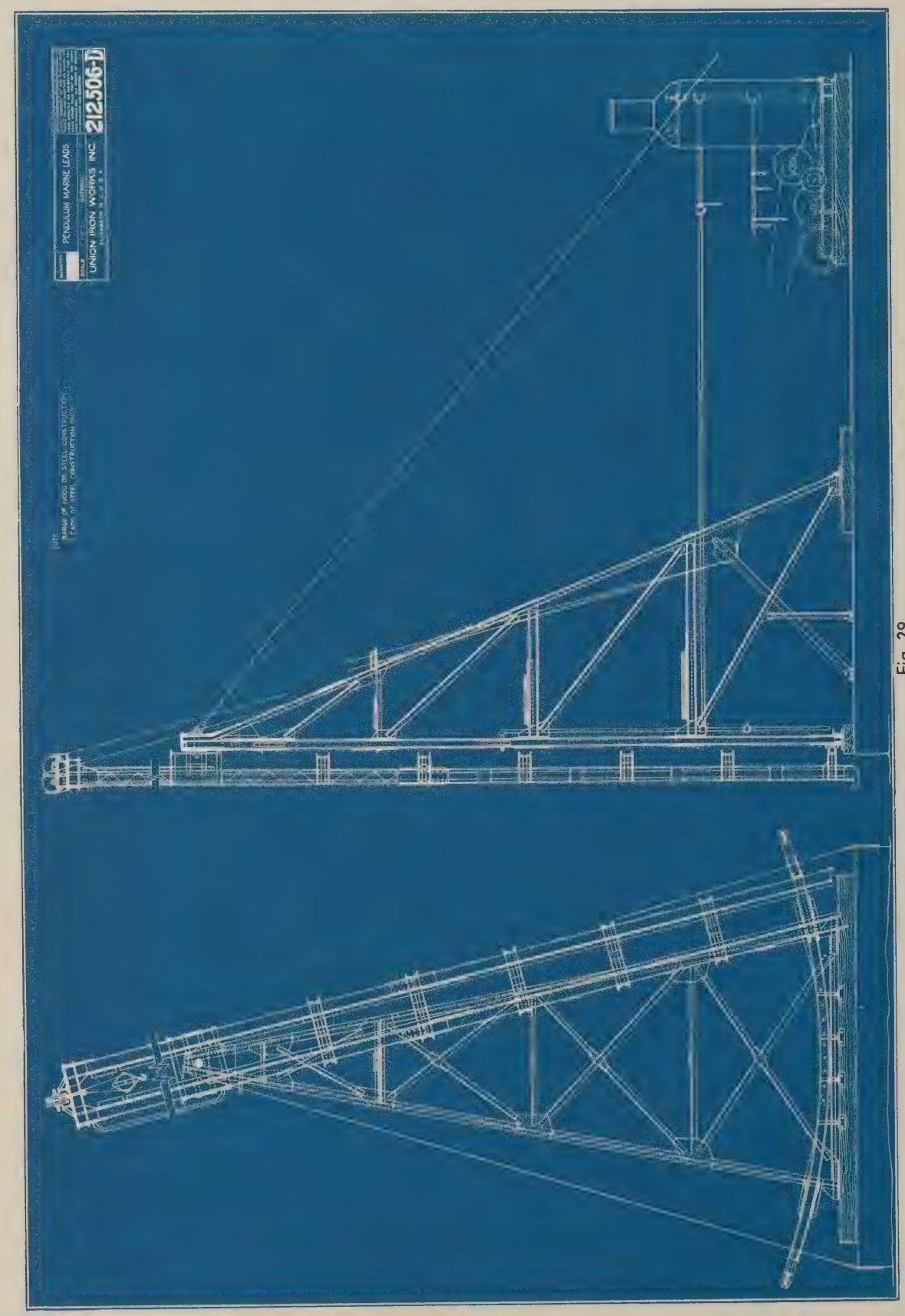


Fig. 29

CODE WORD: **WYEWY**

UNION ALL STEEL PENDULUM LEADS

Line drawing of leads illustrated on page 20. A modified form of this type of leads can be mounted on skids for land work.

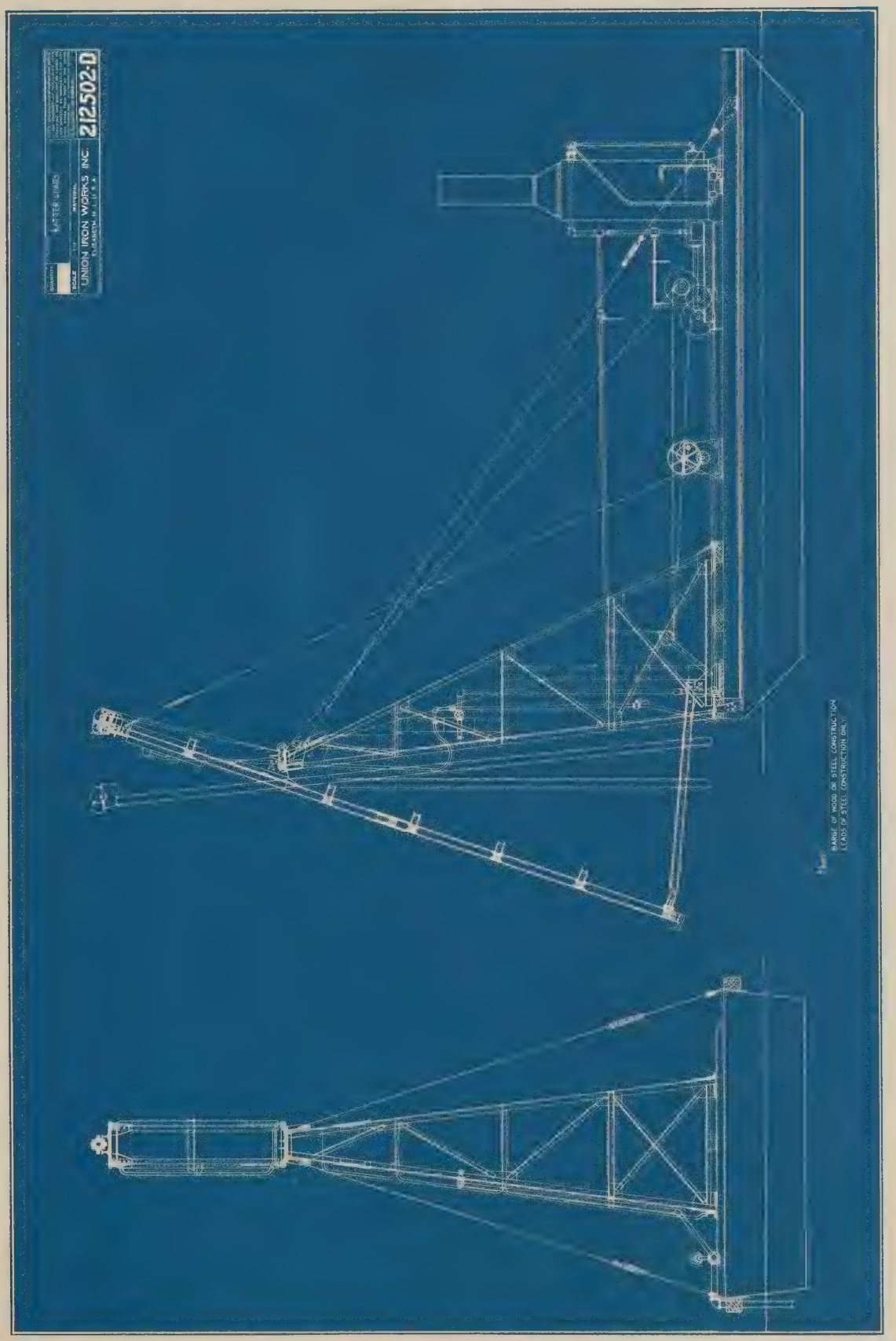


Fig. 30

CODE WORD: **WYKKA**

UNION MARINE FORE AND AFT BATTER LEADS

A very efficient pile driving plant for river and dock work where maneuvering space is limited. This type of leads can also be mounted for land work.

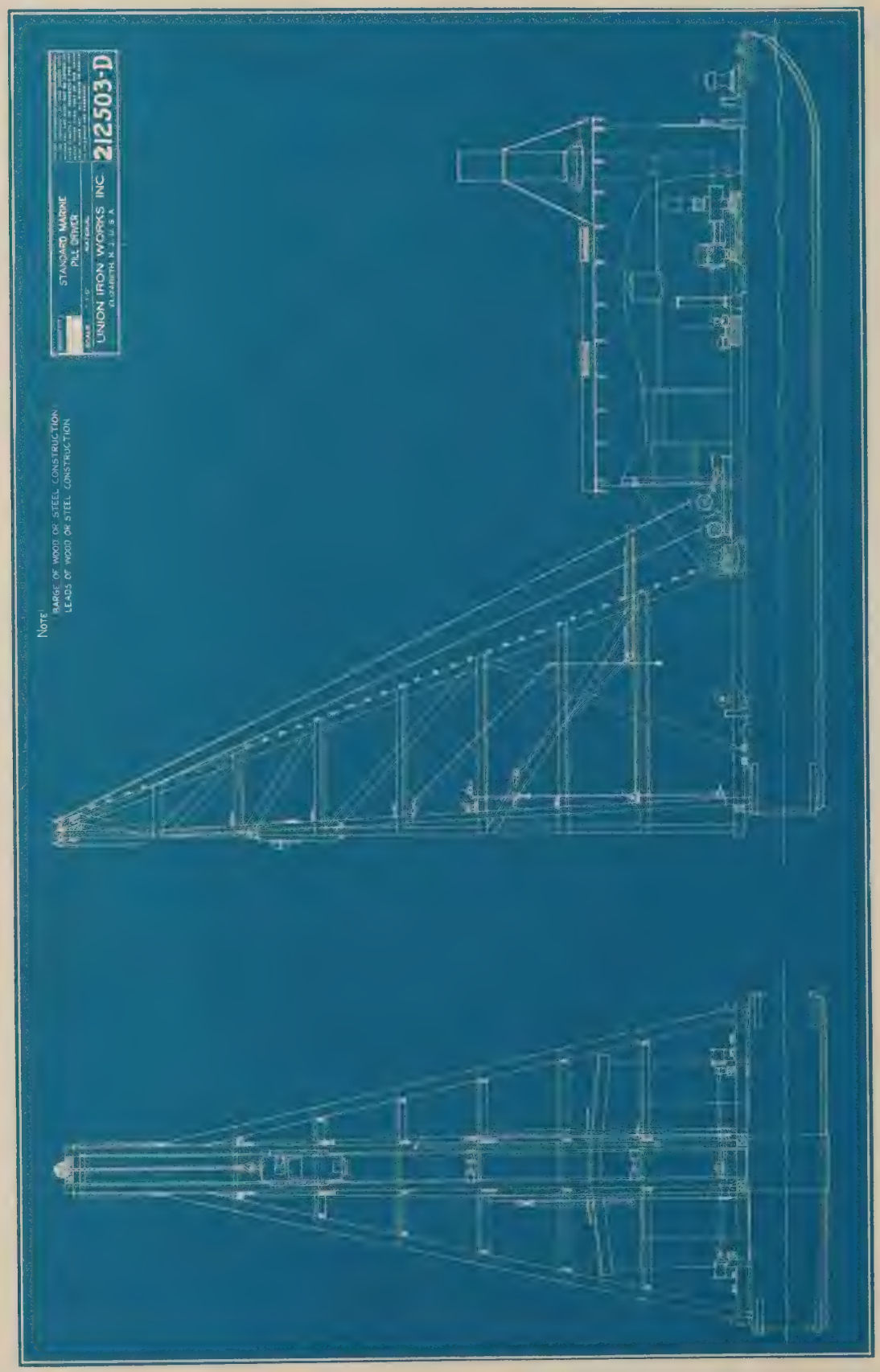


Fig. 31

CODE WORD: **WYERS**

UNION STANDARD MARINE PILE DRIVER

This type can be furnished of all wood or all steel construction or with steel barge and wood leads, etc. We furnish complete plans for wood hull construction but are prepared to furnish steel hulls, knocked down for riveting or welding at destination.

UNION PILE EXTRACTING RIGS

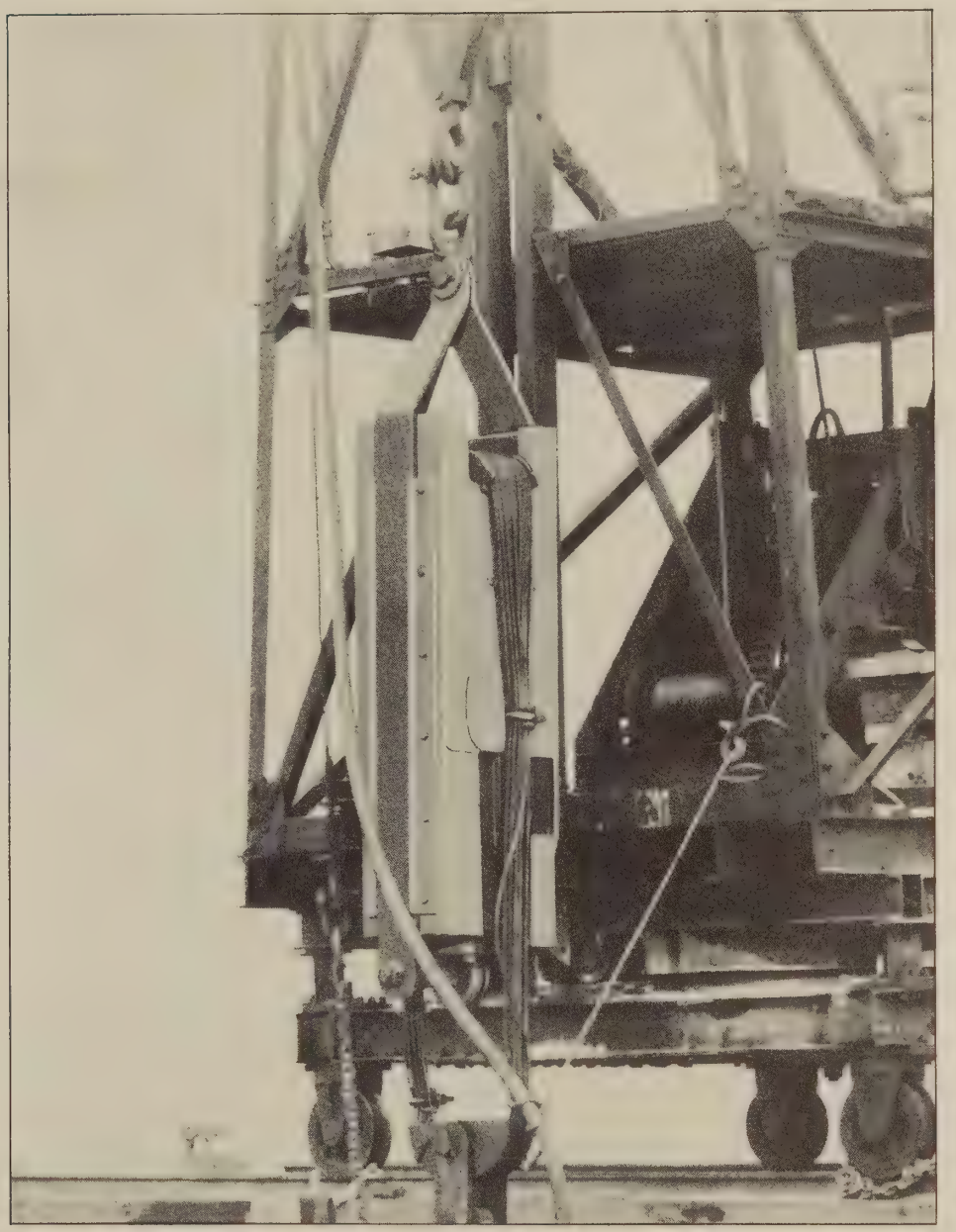


Fig. 32

All sizes of UNION PILE HAMMERS can be used inverted for extracting piles. The only change to operating parts is to replace the regular valve used for driving with a ONE WAY valve.

Following outline drawings show the Flexible and Rigid Yoke types of rigs. Standard rigs are furnished with clevis and pin for attachment to the steel piling but we can also supply Wedge Action Jaws at extra cost. Sling chains are furnished when necessary to extract wood piles or pipe piles.

CODE WORD—RIGID YOKE TYPE: **WYCUH**
CODE WORD—FLEXIBLE YOKE TYPE: **WYCOG**

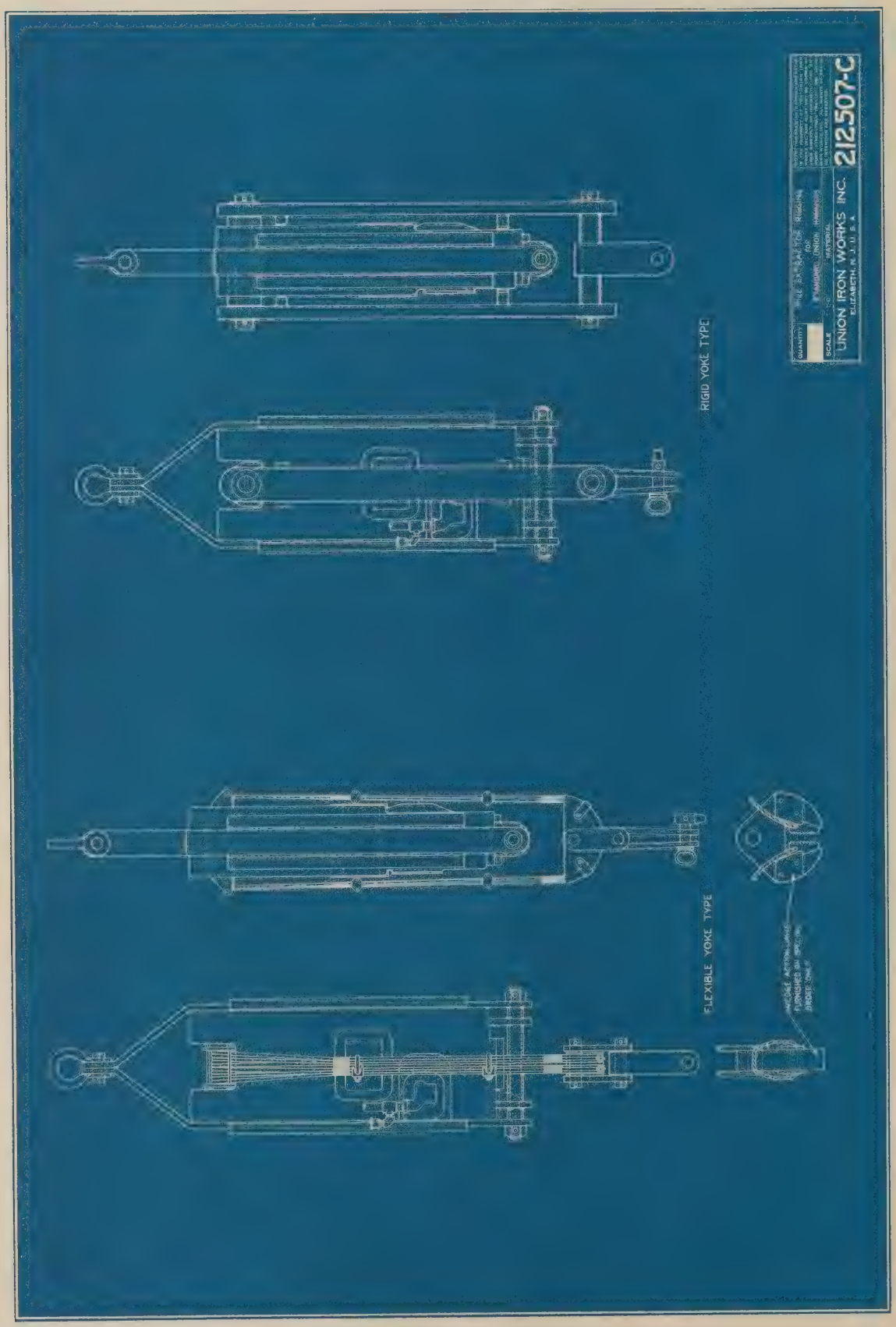


Fig. 33

CODE WORD—RIGID TYPE: **WYCUH**

CODE WORD—FLEXIBLE TYPE: **WYCOG**

EXTRACTING RIGS FOR STANDARD HAMMERS

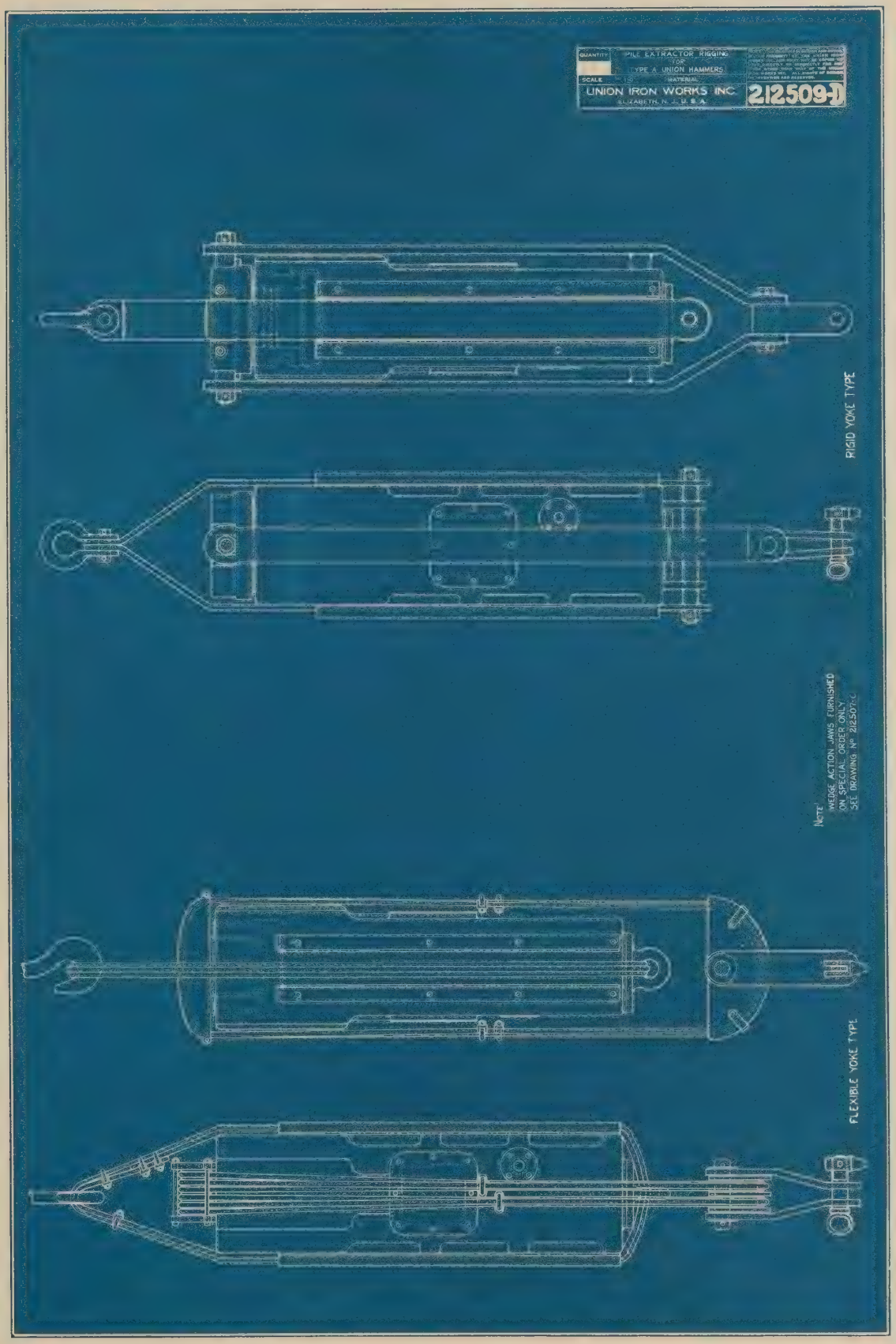


Fig. 34

CODE WORD—RIGID TYPE: **WYCUH**
CODE WORD—FLEXIBLE TYPE: **WYCOG**

EXTRACTING RIGS FOR TYPE 'A' HAMMERS

LIDGERWOOD-UNION PILE DRIVING HOISTS

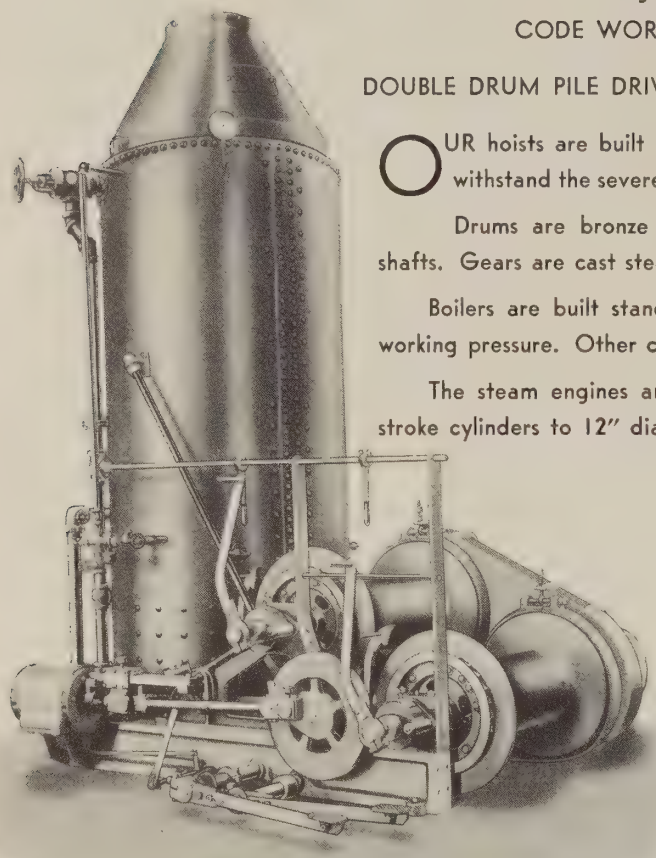


Fig. 35

CODE WORD: **ACFUN**

DOUBLE DRUM PILE DRIVER HOIST AND BOILER

OUR hoists are built special for pile driving work. All parts are proportioned to withstand the severe duty imposed on them.

Drums are bronze bushed and carried on large diameter high carbon steel shafts. Gears are cast steel and pinions forged steel all with machine cut teeth.

Boilers are built standard to A.S.M.E. and Mass. codes for 125 lbs. per sq. in. working pressure. Other codes can be complied with when so ordered.

The steam engines and reciprocating parts can be furnished from 5" dia. x 6" stroke cylinders to 12" dia. x 12" stroke. Drum line pulls from 3000 lbs. to 20000 lbs.

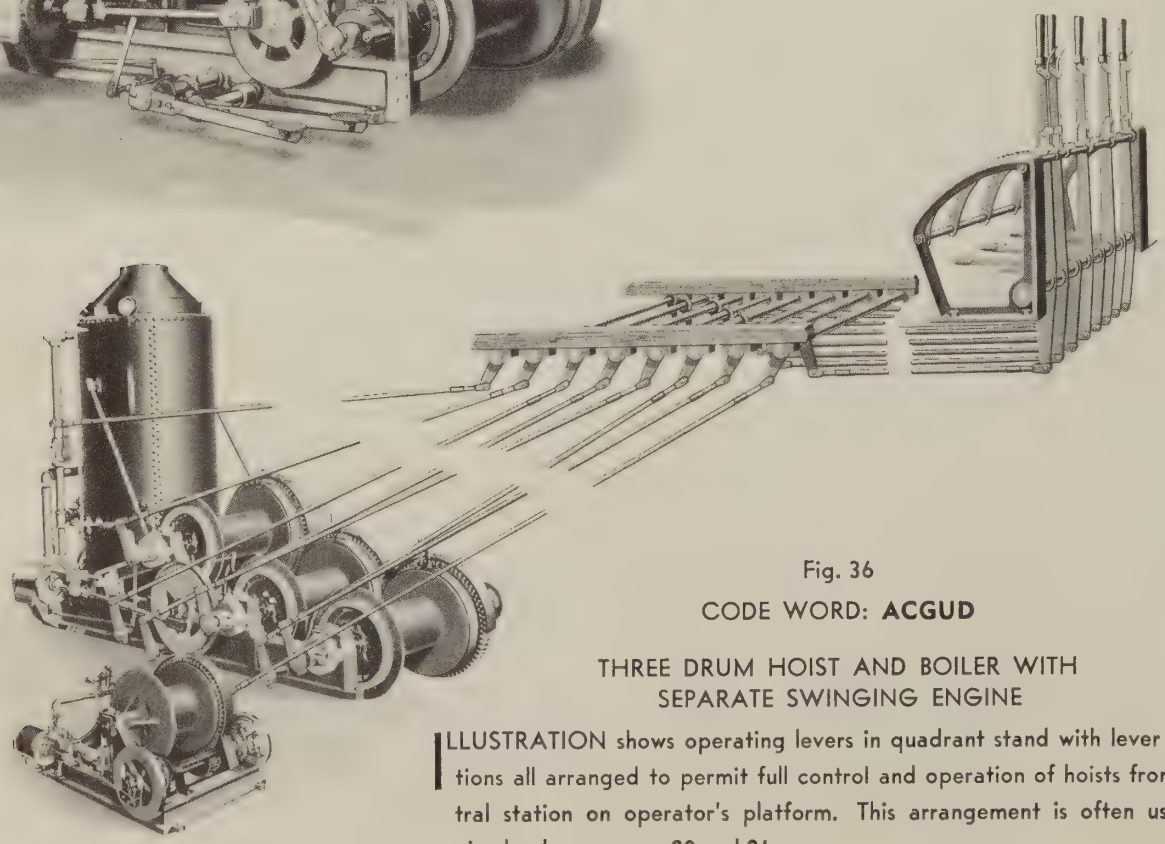


Fig. 36

CODE WORD: **ACGUD**

THREE DRUM HOIST AND BOILER WITH SEPARATE SWINGING ENGINE

ILLUSTRATION shows operating levers in quadrant stand with lever connections all arranged to permit full control and operation of hoists from a central station on operator's platform. This arrangement is often used with marine leads per pages 20 and 21.

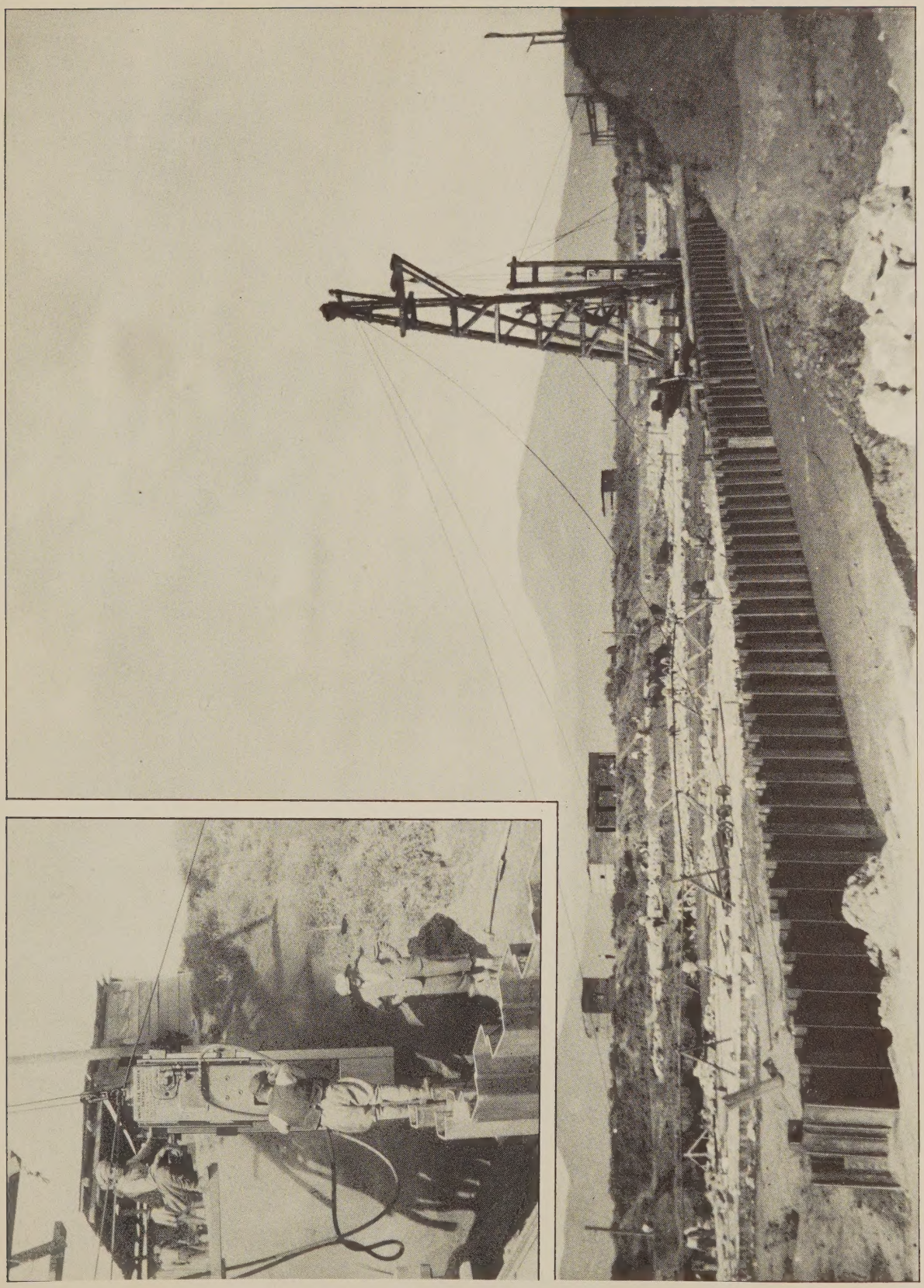


Fig. 37

A Union Pile Hammer driving steel sheet piling in far-off Turkey for an irrigation project. Union Pile Hammers are dependable, easy to operate, simple to adjust and economical in steam or air consumption.

UNION CONSTRUCTION EQUIPMENT

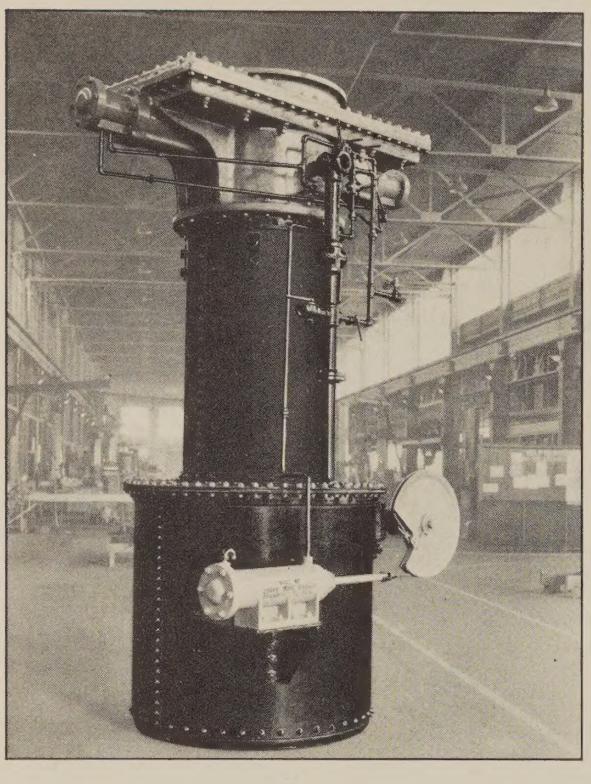


Fig. 38
CODE WORD: **WYLME**
FULL AIR OPERATED, TOP DOOR, MORAN BARR, AIRLOCK

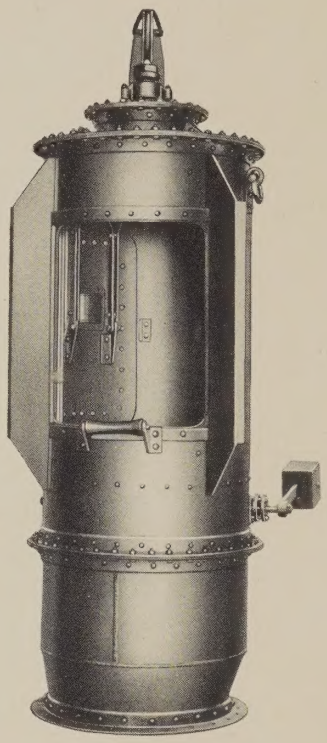


Fig. 39
CODE WORD: **WYLAL**
UNION SIDE DOOR AIRLOCK, MATSON TYPE

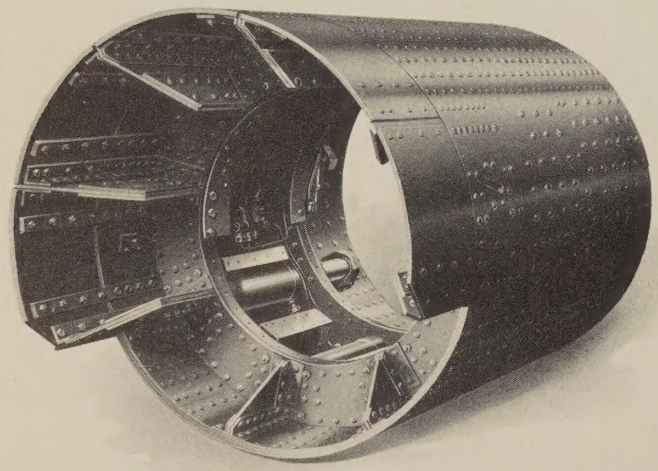


Fig. 40
CODE WORD: **WYNOR**
UNION TUNNEL SHIELD

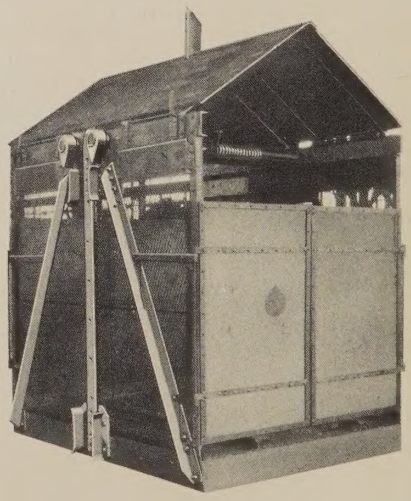


Fig. 41
CODE WORD: **YAFUB**
UNION SAFETY, MINE TYPE, SHAFT CAGE

WRITE FOR CONSTRUCTION EQUIPMENT BULLETIN

UNION CONSTRUCTION EQUIPMENT

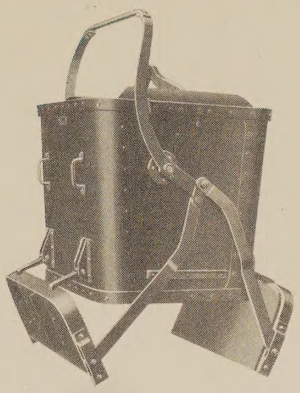


Fig. 42
CODE WORD: **WYOPS**
SINGLE LINE CENTER DUMP CONCRETE BUCKET

Fig. 43
CODE WORD: **WYOLP**
UNIONLOC AUTOMATIC CONCRETE BUCKET

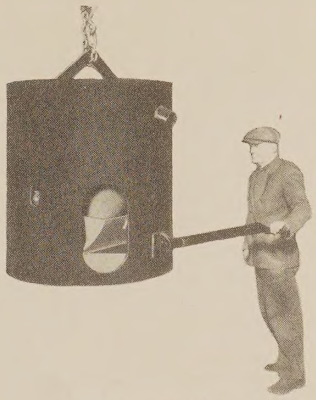


Fig. 44
CODE WORD: **YAVAM**
UNION "R-B" CONCRETE BUCKET

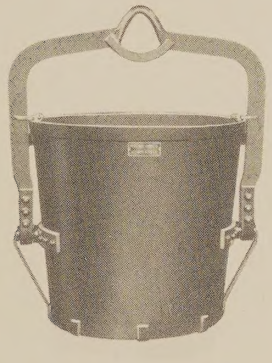


Fig. 45
CODE WORD: **WYOZD**
SHAFT BUCKET

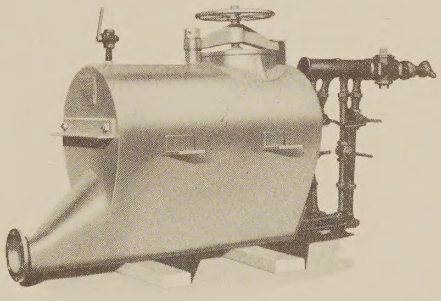


Fig. 46
CODE WORD: **YAELD**
HACKLEY PNEUMATIC CONCRETE PLACER

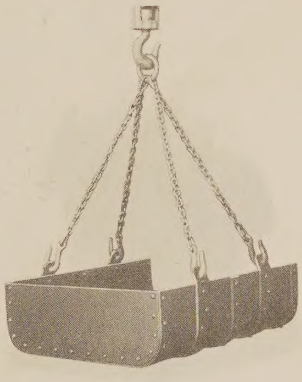


Fig. 47
CODE WORD: **YAOPK**
UNION ROCK SKIP

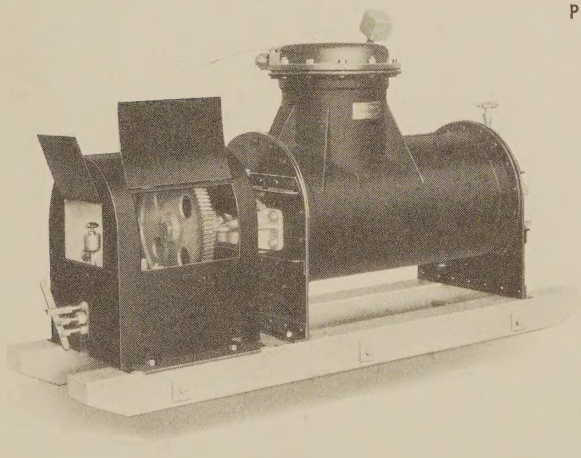


Fig. 48
CODE WORD: **YADVE**
10 CU. FT. UNION GROUT MIXER AND EJECTOR

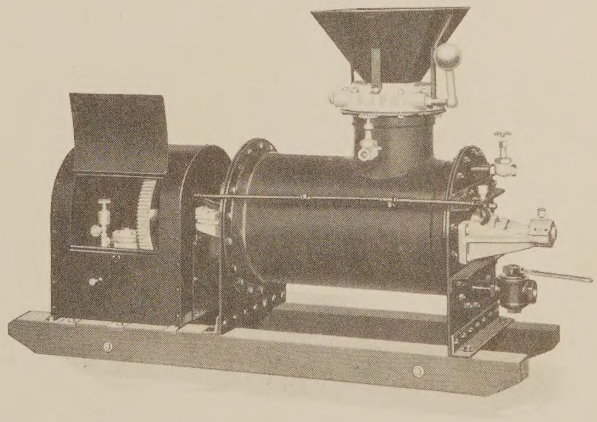


Fig. 49
CODE WORD: **YADTA**
7 CU. FT. UNION GROUT MIXER AND EJECTOR

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